

forming an upper electrode layer on said PZT ferroelectric film,
wherein said step of crystallizing said PZT ferroelectric film is conducted by
setting a composition of said atmosphere such that said atmosphere contains
said oxidizing gas with a fraction of 1 to [50] 20% in volume.

15. (Twice Amended) A semiconductor device, comprising:
a substrate;
an active device element formed on said substrate;
an insulation film provided over said substrate to cover said active
device element;
a lower electrode containing Pt provided over said insulation film;
a PZT ferroelectric film provided on said lower electrode, said PZT
ferroelectric film having a columnar microstructure extending from an interface
between said lower electrode and said PZT ferroelectric film in a direction
substantially perpendicular to a principal surface of said lower electrode, said
PZT ferroelectric film essentially consisting of crystal grains having a generally
uniform grain diameter of less than about 200 nm; and
an upper electrode provided on said PZT ferroelectric film.

21. (Twice Amended) A method of fabricating a semiconductor
device having a ferroelectric capacitor, comprising the steps of:
forming an active device element on a substrate;
forming an insulation film over said substrate to cover said active
device element;
forming a lower electrode layer of said ferroelectric capacitor over said
insulation film;
forming [a] an amorphous PZT ferroelectric film on said lower electrode
layer as a capacitor insulation film of said ferroelectric capacitor;
crystallizing said amorphous PZT ferroelectric film by applying a
thermal annealing process in an atmosphere containing a non-oxidizing gas
and an oxidizing gas; and
forming an upper electrode layer on said PZT ferroelectric film,
wherein said step of crystallizing said PZT ferroelectric film is conducted by
setting the composition of said atmosphere such that said atmosphere